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# FEDERAL-STATE COOPERATIVE SNOW SURVEYS and IRRIGATION WATER FORECASTS

for  
**RIO GRANDE DRAINAGE BASIN**

February 1, 1948



by  
Division of Irrigation, Soil Conservation Service  
United States Department of Agriculture  
and  
Colorado Agricultural Experiment Station

Data indicated in this report were obtained by the agencies named above in cooperation with the U. S. Forest Service, National Park Service, State Landowners of Colorado and New Mexico and other Federal, State and local organizations.



February 1, 1949

Water Supply Outlook

Rio Grande and Canadian Drainage Basins

The water supply outlook for irrigated areas served by the Rio Grande and its tributaries in San Luis Valley is well above normal for February 1. Water content of the snow on most courses is about twice the past 11-year average, and the maximum of record for this date since 1939. Along the Sangre de Cristo range and into New Mexico the snow cover is above normal but no unusual snow accumulation has occurred. Soil moisture conditions are generally dry in San Luis Valley and into New Mexico except for the extreme southern districts. On the headwaters of the Pecos and Canadian Rivers the snow water content is about average and the same as a year ago.

RIO GRANDE

Snow accumulation along the Continental Divide to the west of San Luis Valley is very high and greater than at any time since February 1 snow surveys started in 1939. However, any estimate of runoff based on this information should be considered as preliminary and subject to snow that will come later in the season and to other factors such as temperature at melting time. On high elevation courses the snow water content is now about the same as the average for April 1 and at medium elevations around 9000 feet water content is relatively much greater. It is probable that the melt season runoff will be considerably above normal on the Upper Rio Grande, Alamosa and Conejos rivers. If the present rate of snow accumulation should continue flood damage should be expected. In the Sangre de Cristo range snow cover is near normal. Little snow is reported on the valley floor and soil moisture conditions are poor.

Similar snow conditions exist on the headwaters of the Rio Chama as in San Luis Valley. Elsewhere in northern New Mexico the snow fall has been about normal. Soil moisture conditions are reported as good at higher elevations but poor in the middle Rio Grande area. Storage in El Vado reservoir is now 147,000 acre-feet, 65 percent of capacity, in contrast to a near empty reservoir on February 1, 1948.

The combined storage in Elephant Butte and Caballo reservoirs is 627,000 acre-feet as compared to 524,000 a year ago. This reverses a long trend toward lower reservoir levels. Soil moisture and crop conditions are described as good in the Lower Rio Grande Valley. Recent precipitation has been above normal and temperatures have been low.

On the headwaters of the Pecos River near Santa Fe, the snow water content measured on the courses is only five percent above the past ten-year average. On the Carlsbad project soil moisture and crop conditions are good. The total water stored in McMillan, Avalon, and Alamogordo Reservoirs is 32,000 acre-feet, the same as last year.

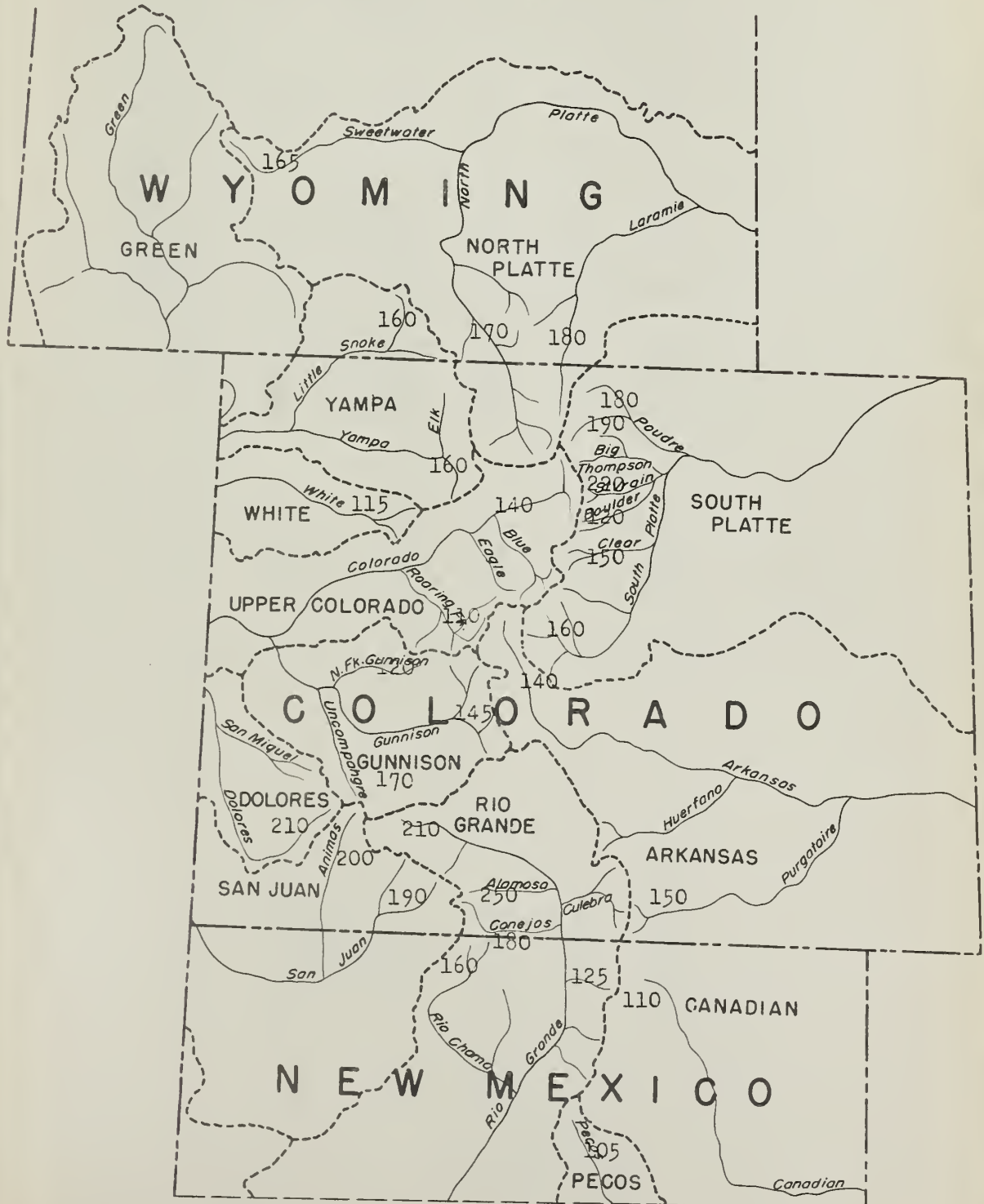
CANADIAN RIVER

On the tributaries of the Canadian River the snow cover is near normal and the same as a year ago. Conchas Reservoir has 307,000 acre-feet in storage, 40,000 less than on February 1, 1948. Recent precipitation on the Tucumcari project has been about normal. Soil moisture and crop conditions are fair.



WATER CONTENT OF SNOW ON THE WATERSHEDS OF  
PLATTE, ARKANSAS, UPPER COLORADO AND RIO GRANDE BASINS  
BASED ON SNOW SURVEYS MADE APPROXIMATELY FIRST DAY OF MONTH

In Percent of Normal  
February 1, 1949









SNOW SURVEYS AND IRRIGATION WATER FORECASTS  
RIO GRANDE BASIN

STATUS OF RESERVOIR STORAGE, February 1, 1949

STREAM	RESERVOIR	USABLE CAPACITY 1000 A.F.	THOUSANDS OF ACRE FEET IN STORAGE				
			About February 1				10-year Ave.
			1949	1948	1947	1946	1938-47
RIO GRANDE	Rio Grande	45.8	16.6	20.7	4.0	4.9	13.6
	Santa Maria	45.0	17.1	4.9	3.5	4.9	8.5
	Sanchez	103.0	4.8	8.7	5.9	6.1	15.2
	Terrace	17.7	1.5	5.6	2.6	1.4	2.9
	Continental	26.7	5.2	2.6	1.3	13.1	7.3
	Elephant Butte	2273.7	496.3	436.0	564.1	1099.6	1154.0
CHAMA RIVER	Caballo	365.0	130.5	88.1	254.7	230.1	195.0
	El Vado	226.0	147.0	6.0	24.5	87.2	53.4
CANADIAN RIVER	Conchas	600.0	307.0	348.0	370.6	322.5	241.5
PECOS RIVER	Alamogordo	148.0	25.0	26.2	44.7	24.0	66.0
	McMillan-Avalon	45.0	7.1	6.2	12.4	7.2	17.4



SNOW SURVEYS AND IRRIGATION WATER FORECASTS  
for  
RIO GRANDE BASIN  
February 1, 1949

SUMMARY OF FEBRUARY 1 SNOW SURVEYS AND COMPARISON OF DATA WITH THAT OF  
PREVIOUS YEARS BY WATERSHEDS

WATERSHEDS	Snow Depth		Water Content		Number Courses in Average	Snow Density		1949 Water Content in percent of	
	Ten year Avg.*	1948	1949	Ten Year Avg.*		Ten year Avg.*	1948	1949	Ten Year Avg.*
	In.	In.	In.	In.		Percent	Percent	Percent	1948
Rio Grande (Colo)	26.3	28.2	43.4	6.2	9	24	23	25	177
Upper Rio Grande	30.2	33.6	57.6	7.2	3	24	23	26	208
Alamosa River	20.2	19.8	35.9	3.4	1	17	13	23	244
Conejos River	33.4	25.6	51.6	8.6	2	26	27	29	175
Culebra River	26.2	29.7	33.3	6.4	1	24	28	22	115
Rio Grande (N.M.)	21.7	20.1	28.2	5.2	13	24	20	22	125
Chama River	29.3	22.8	44.7	7.6	5	26	20	27	157
Pecos River	17.7	16.6	19.8	4.1	3	23	23	22	105
Canadian River	19.6	21.2	21.9	4.4	4	22	22	22	107

\*Some for shorter periods

P R E C I P I T A T I O N   D A T A

WATERSHED	STATE	Precipitation		Departure		Precipitation*		Departure	
		October 1 to January 31	Inches	from Normal	Inches	January	Inches	from Normal	Inches
Canadian	New Mexico		3.32				.75		+0.31
Rio Grande	Colorado		3.16				1.11		+0.25
Rio Grande (N)	New Mexico		4.32				2.10		+0.33
Rio Grande (S)	New Mexico		2.69				1.32		+0.37
Pecos	New Mexico		3.03				2.13		+1.66

\*January precipitation tentative

no. 10

# RIO GRANDE DRAINAGE SNO. SURVEYS

February 1, 1949

Drainage Basin and Snow Course	No. and State	Location			Elev.	Date of Survey	Snow Cover Measurements				Past Record																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
		Sec.	Twp.	Range			Snow Depth (Inches)	Water Content (Inches)	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395	2396	2397	2398	2399	2400	2401	2402	2403	2404	2405	2406	2407	2408	2409	2410	2411	2412	2413	2414	2415	2416	2417	2418	2419	2420	2421	2422	2423	2424	2425	2426	2427	2428	2429	2430	2431	2432	2433	2434	2435	2436	2437	2438	2439	2440	2441	2442	2443	2444	2445	2446	2447	2448	2449	2450	2451	2452	2453	2454	2455	2456	2457	2458	2459	2460	2461	2462	2463	2464	2465	2466	2467	2468	2469	2470	2471	2472	2473	2474	2475	2476	2477	2478	2479	2480	2481	2482	2483	2484	2485	2486	2487	2488	2489	2490	2491	2492	2493	2494	2495	2496	2497	2498	2499	2500	2501	2502	2503	2504	2505	2506	2507	2508	2509	2510	2511	2512	2513	2514	2515	2516	2517	2518	2519	2520	2521	2522	2523	2524	2525	2526	2527	2528	2529	2530	2531	2532	2533	2534	2535	2536	2537	2538	2539	2540	2541	2542	2543	2544	2545	2546	2547	2548	2549	2550	2551	2552	2553	2554	2555	2556	2557	2558	2559	2560	2561	2562	2563	2564	2565	2566	2567	2568	2569	2570	2571	2572	2573	2574	2575	2576	2577	2578	2579	2580	2581	2582	2583	2584	2585	2586	2587	2588	2589	2590	2591	2592	2593	2594	2595	2596	2597	2598	2599	2600	2601	2602	2603	2604	2605	2606	2607	2608	2609	2610	2611	2612	2613	2614	2615	2616	2617	2618	2619	2620	2621	2622	2623	2624	2625	2626	2627	2628	2629	2630	2631	2632	2633	2634	2635	2636	2637	2638	2639	2640	2641	2642	2643	2644	2645	2646	2647	2648	2649	2650	2651	2652	2653	2654	2655	2656	2657	2658	2659	2660	2661	2662	2663	2664	2665	2666	2667	2668	2669	2670	2671	2672	2673	2674	2675	2676	2677	2678	2679	2680	2681	2682	2683	2684	2685	2686	2687	2688	2689	2690	2691	2692	2693	2694	2695	2696	2697	2698	2699	2700	2701	2702	2703	2704	2705	2706	2707	2708	2709	2710	2711	2712	2713	2714	2715	2716	2717	2718	2719	2720	2721	2722	2723	2724	2725	2726	2727	2728	2729	2730	2731	2732	2733	2734	2735	2736	2737	2738	2739	2740	2741	2742	2743	2744	2745	2746	2747	2748	2749	2750	2751	2752	2753	2754	2755	2756	2757	2758	2759	2760	2761	2762	2763	2764	2765	2766	2767	2768	2769	2770	2771	2772	2773	2774	2775	2776	2777	2778	2779	2780	2781	2782	2783	2784	2785	2786	2787	2788	2789	2790	2791	2792	2793	2794	2795	2796	2797	2798	2799	2800	2801	2802	2803	2804	2805	2806	2807	2808	2809	2810	2811	2812	2813	2814	2815	2816	2817	2818	2819	2820	2821	2822	2823	2824	2825	2826	2827	2828	2829	2830	2831	2832	2833	2834	2835	2836	2837	2838	2839	2840	2841	2842	2843	2844	2845	2846	2847	2848	2849	2850	2851	2852	2853	2854	2855	2856	2857	2858	2859	2860	2861	2862	2863	2864	2865	2866	2867	2868	2869	2870	2871	2872	2873	2874	2875	2876	2877	2878	2879	2880	2881	2882	2883	2884	2885	2886	2887	2888	2889	2890	2891	2892	2893	2894	2895	2896	2897	2898	2899	2900	2901	2902	2903	2904	2905	2906	2907	2908	2909	2910	2911	2912	2913	2914	2915	2916	2917	2918	2919	2920	2921	2922	2923	2924	2925	2926	2927	2928	2929	2930	2931	2932	2933	2934	2935	2936	2937	2938	2939	2940	2941	2942	2943	2944	2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$\frac{1}{\sqrt{\pi}} \int_{-\infty}^{\infty} f(x) e^{-x^2} dx = \frac{1}{\sqrt{\pi}}$



# RIO GRANDE DRAINAGE SNOW SURVEYS

February 1, 1949

Drainage Basin and Snow Course	Location				Snow Cover Measurements							
	No. and State	Sec.	Twp. or La t.	Range or Long.	Elev.	Date of Survey	Snow Depth (Inches)	Water Content (Inches)			Yrs.of Rec.	Past Record Av. Water Content (Inches)
ALAMOS A RIVER Silver Lakes Summitville Stunner Pass	47 Colo.	15	36N	5E	9600	1/30	35.9	1949	1948	1947	9	3.4
	76 "	30	37N	4E	11500					14.0	10	
	107 "	16	36N	4W	10550		<u>35.9</u>	<u>8.3</u>	<u>2.5</u>	<u>4.7</u>		<u>3.4</u>
	Average for drainage											
CONEJOS RIVER River Springs Cumbres Pass #2 Stunner Pass Platoro West Conejos La Manga	49 Colo	25	33N	6E	9300	2/1	32.2	8.5	5.2	6.5	8	4.5
	77 "	17	32N	5E	10000	1/30	71.0	21.7	8.7	11.8	10	12.7
	107 "	16	36N	4W	10550							
	108 "	22	36N	4W	9950							
	109 "	25	35N	4E	9450							
	110 "	24	32N	5E	10100	2/1	72.0 <u>51.6</u>	21.1 <u>15.1</u>	<u>7.0</u>	<u>9.2</u>		<u>8.6</u>
Average for Drainage												
CULEBRA RIVER Culebra	82 Colo.		37.2N	105.2W	10000	1/31	33.3	7.4	8.4	8.3	9	6.4
	RIO GRANDE IN NEW MEXICO											
CHAMA RIVER Cumbres Pass #2 Canjilon Pay Role Chama Divide Chamita	77 Colo.	17	32N	5E	10000	1/30	71.0	21.7	8.7	11.8	10	12.7
	6 N.M.	4	26N	6E	9500	1/31	37.7	8.8	2.8	10.4	9	9.2
	15 "	16	28N	7E	9700	2/1	43.3	12.4	4.4	7.8	8	6.2
	17 "		36.9N	106.7W	7750	1/31	31.1	6.7	2.7	2.8	9	4.1
	18 "		36.9N	106.7W	8500	2/1	40.5 <u>44.7</u>	10.0 <u>11.9</u>	4.5 <u>4.6</u>	<u>6.5</u> <u>7.9</u>	7	<u>5.9</u> <u>7.6</u>
Average for Drainage												





RIO GRANDE DRAINAGE SNOW SURVEYS  
February 1, 1949

Drainage Basin and Snow Course	No. and State	Location		Snow Cover Measurements									
		Sec.	Twp. or Lat.	Range or Long.	Elev. or Surf.	Date of Survey	Snow depth (inches)	Water Content (Inches)			Past Record		
								1949	1948	1947	Years of Rec.	Ave. Water Content (Inches)	
RIO GRANDE IN NEW MEXICO													
Red River	1 N.M.	29	28N	15E	9500	1/28	28.0	6.9	3.6	3.8	9	5.1	
Taos Canyon	2 "	10	25N	15E	9000	2/1	13.7	3.3	3.8	6.2	10	5.2	
Aspen Grove	4 "	12	18N	10E	9100	1/30	16.2	3.0	3.9	2.1	10	4.4	
Lee Ranch	5 "	3	18N	4E	9050	2/1	35.6	6.8	4.4	4.3	10	5.1	
Canjilon	6 "	4	26N	6E	9500	2/1	37.7	8.8	2.8	10.4	9	9.2	
Hematite Park*	9 "	8	28N	15E	9500	1/29	18.0	4.2	5.4	4.1	8	3.7	
Tres Ritos	12 "	23	22N	13E	9000	2/1	19.7	3.4	4.2	4.8	10	4.7	
Pay Role	15 "	16	28N	7E	9700	2/1	43.3	12.4	4.4	7.8	8	6.2	
Chama Divide	17 "		36.9N	106.7W	7750	1/31	31.1	6.7	2.7	2.8	9	4.1	
Chamita	18 "		36.9N	106.7W	8500	2/1	40.5	10.0	4.5	6.5	7	5.9	
Cordova	19 "	22	22N	13E	10100	1/31	39.3	9.3	5.8	7.0	7	6.7	
Panchuela #2	20 "	27	19N	12E	8300	2/1	18.3	4.1	3.6	1.8	10	3.3	
Big Tesuque	21 "	17	18N	11E	10000	1/30	25.0	5.9	4.3	3.0	7	4.7	
Elk Cabin	24 "	8	18N	11E	8250	1/31	14.5	3.2	4.1	5.0		5.2	
			Average for Drainage				28.2	6.5	4.1				
PECOS RIVER													
Aspen Grove*	4 N.M.	12	18N	10E	9100	1/30	16.2	3.0	3.9	2.1	10	4.4	
Panchuela #2	20 "	27	19N	12E	8300	1/30	18.3	4.1	3.6	1.8	10	3.3	
Pig Tesuque*	21 "	17	18N	11E	10000	1/30	25.0	5.9	4.3	3.0	7	4.7	
Gallinas	25 "	31	18N	14E	8700	1/30	22.6	5.4	2.7	2.3		4.1	
			Average for Drainage				19.8	4.3	3.9				
CANADIAN RIVER													
Hematite Park	9 N.M.	8	28N	15E	9500	1/29	18.0	4.2	5.4	4.1	8	3.7	
Ocate Mesa	10 "	25	24N	16E	9200	1/28	10.7	1.9	3.3	2.4	8	2.4	
Tres Ritos*	12 "	23	22N	13E	9000	2/1	19.7	3.4	4.2	4.8	10	4.7	
Cordova*	19 "	22	22N	13E	10100	1/31	39.3	9.3	5.8	7.0	7	6.7	
			Average for Drainage				21.9	4.7	4.7	4.6		4.4	
*On adjacent drainage													

\*On adjacent drainage

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